

## CLAIMS:

1. A user interface description generating apparatus comprising:  
a sketch identifier for examining a manual sketch of objects to identify sketched versions of the objects, the sketch being representative of a graphic user interface (GUI) to be created;  
a sketch normalizer for conforming the identified sketched versions to resemble respective reference images;  
a hierarchy determiner for determining, from the conformed versions, a hierarchy of relative containment among said conformed versions; and  
a description generator for generating, from said hierarchy, a user interface description for creating the GUI.
2. The apparatus of claim 1, wherein said reference images comprise vector images.
3. The apparatus of claim 1, wherein the sketch normalizer is configured for straightening lines and making lines mutually parallel.
4. The apparatus of claim 1, wherein the manual sketch includes characters, and wherein the sketch identifier is configured for applying optical character recognition (OCR).
5. The apparatus of claim 1, wherein said description generator is further configured for generating the user interface description to contain a layout of said conformed versions.
6. The apparatus of claim 1, wherein the description generator is configured to generate the user interface description into a format specific to a target platform for the GUI.
7. The apparatus of claim 1, wherein the description generator is configured for generating the description into a hierarchical, structured mark-up language.

8. The apparatus of claim 1, further comprising:  
an electronic storage medium;  
a hand-held pen for creating the sketch; and  
a digitizer for recording into the medium the sketch in real time as the sketch is being created.

9. The apparatus of claim 8, wherein the apparatus stores in said medium a normalized sketch comprising the conformed versions, said apparatus further comprising a sketch editor for editing said normalized sketch stored in said medium, said digitizer being configured for augmenting, according to input from the pen, said normalized sketch stored in said medium.

10. The apparatus of claim 1, further comprising:  
an electronic storage medium for storing said reference images; and  
wherein the sketch identifier is configured for using the stored reference images in identifying said sketched versions.

11. The apparatus of claim 1, wherein the description generator is configured to generate the user interface description to reflect a stacking order based on an annotation to a sketched version of an object in said sketch, said annotation indicating a priority for the annotated object with respect to at least one other of the objects as to which of two objects has priority to overlay the other of the two in said GUI.

12. The apparatus of claim 11, said apparatus being further configured to recognize that said annotation indicates priority based on a dividing line within said sketched version of an object.

13. A user interface description generating method comprising the steps of:

manually sketching objects to create a sketch representative of a graphic user interface (GUI) to be created; and

automatically performing the functions of:

examining the sketch to identify sketched versions of the objects;

conforming the identified sketched versions to resemble respective reference images;

determining, from the conformed versions, a hierarchy of relative containment among said conformed versions; and

generating, from said hierarchy, a user interface description for creating the GUI.

14. The method of claim 13, wherein the sketching step further includes the step of sketching, as an annotation to at least one of the objects, a label of a function of the object in said GUI.

15. The method of claim 13, wherein the sketching step further includes the step of sketching, as an annotation to at least one of the sketched versions of objects, a respective designation of a stacking order of that object with respect to at least one other of the objects to indicate which of two objects has priority to overlay the other of the two in said GUI.

16. The method of claim 13, wherein at least one of the sketched versions of an object intersects another sketched version of an object, and wherein the sketching step further includes the step of sketching, as an annotation to at least one of two mutually intersecting ones of the versions, a label of a function of the respective object in said GUI.

17. The method of claim 16, wherein the hierarchy determining step relatively positions in said hierarchy respective objects of said two mutually intersecting ones based on an annotation created in the annotation sketching step.

18. The method of claim 13, wherein the sketching step further comprises the steps of:

manipulating a pen by hand to create the sketch; and  
recording into the medium the sketch in real time as the sketch is being created.

19. The method of claim 13, further comprising the step of pre-storing said reference images to aid in the identification performed in the examining step.

20. A computer program product comprising a computer-readable medium in which a computer program is stored for execution by a processor to generate a user interface description, the program comprising:

- a sequence of instructions for examining a manual sketch of objects to identify sketched versions of the objects, the sketch being representative of a graphic user interface (GUI) to be created;

- a sequence of instructions for conforming the identified sketched versions to resemble respective reference images;

- a sequence of instructions for determining, from the conformed versions, a hierarchy of relative containment among said conformed versions; and

- a sequence of instructions for generating, from said hierarchy, a user interface description for creating the GUI.